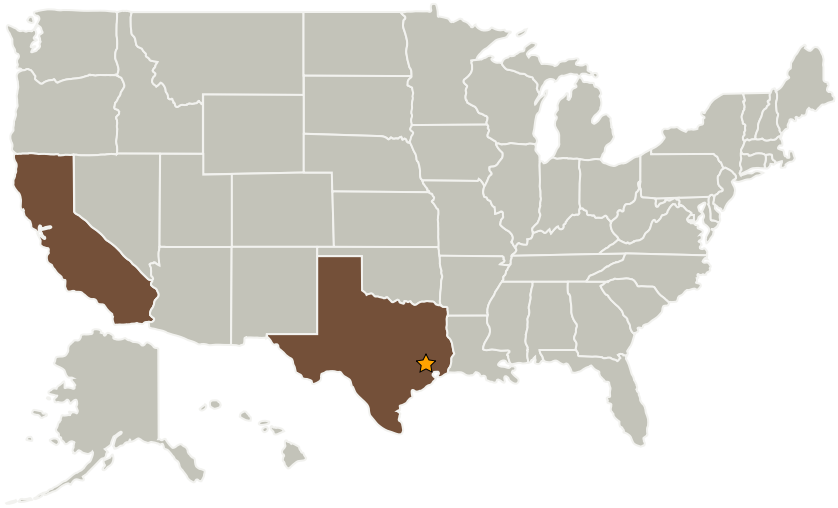
Miniaturized UHF, S-, and Ka-band RF MEMS Filters for Small Form Factor, High Performance EVA Radio, Phase II

Completed Technology Project (2008 - 2010)

Project Introduction

In Phase II of this SBIR, Harmonic Devices (HDI) proposes to develop miniaturized MEMS filters at UHF, S-band and Ka-band to address the requirements of NASA's next-generation software defined EVA radio. The filters are a key enabler for this highly reconfigurable, fault tolerant, cell-phone sized EVA radio. For UHF and S-band, HDI will employ its proprietary contour-mode aluminum nitride MEMS piezoelectric resonator technology. Processed on silicon substrates, the resonators have their natural frequency defined by the lateral, in-plane dimensions of the structure. This feature enables the definition of different frequencies directly at the CAD layout level. Thus, the low insertion loss UHF and S-band filters can be monolithically integrated into a single chip. For the Ka-band, HDI will employ coaxial 3D MEMS interdigital filters that exhibit low insertion and ripple in a miniaturized form factor. Several US companies have expressed a keen interest in HDI's technology. In Phase I, HDI successfully proved the feasibility of employing the proposed UHF, S-band, and Ka-band filters in NASA's software defined EVA radio through simulation and microfabrication pilot studies. The filters can be monolithically integrated onto the same silicon substrate, resulting in substantial savings in board space. The objective of Phase II is to build the filter prototypes and deliver them to NASA for testing. The results of the Phase I feasibility study convincingly justify Phase II continuation.

Primary U.S. Work Locations and Key Partners



Miniaturized UHF, S-, and Ka-band RF MEMS Filters for Small Form Factor, High Performance EVA Radio, Phase II

Table of Contents

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Johnson Space Center (JSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Small Business Innovation Research/Small Business Tech Transfer

Miniaturized UHF, S-, and Ka-band RF MEMS Filters for Small Form Factor, High Performance EVA Radio, Phase II

Completed Technology Project (2008 - 2010)

Organizations Performing Work	Role	Type	Location
★Johnson Space Center(JSC)	Lead Organization	NASA Center	Houston, Texas
Harmonic Devices, Inc.	Supporting Organization	Industry	Berkeley, California

Primary U.S. Work Locations	
California	Texas

Project Transitions

March 2008: Project Start

March 2010: Closed out

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.2 Extravehicular Activity Systems
    - TX06.2.3 Informatics and Decision Support Systems